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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/172,553	10/14/1998	JAMES E. GREEN	2914.IUS	9441

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EXAMINER

DIAZ, JOSE R

ART UNIT PAPER NUMBER

2815

DATE MAILED: 01/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/172,553

Applicant(s)

GREEN ET AL.

Examiner

José R. Díaz

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 31-35 and 37-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 31-35 and 37-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

- The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

- Claims 31-34, 37-41 and 44-45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 31-34, the term "contiguous" is confusing. Applicant states in page 6 of the Remarks that "the term "contiguous" refers to structures (1) that touch one another, (2) that share a boundary, or (3) that are connected without a break therebetween." However, such definitions of the term "contiguous", as proposed by Applicant, is improper since at least the proposed definitions 1 and 3 are not supported by the Specification. For instance, Applicant shows in Figure 22 (see below) webs or mesas (A) that are not "contiguous" since they are separated from the other mesas or webs.

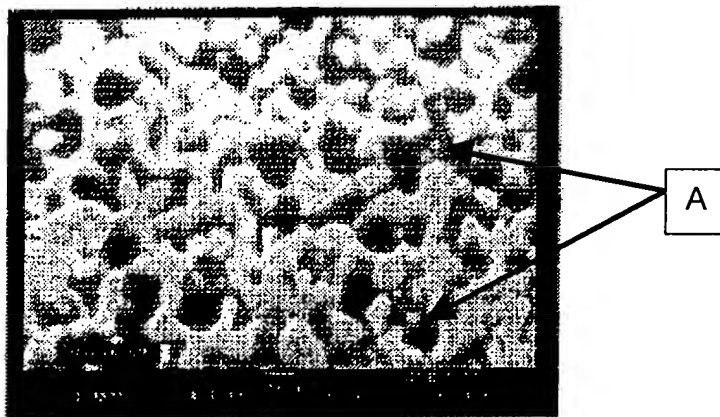
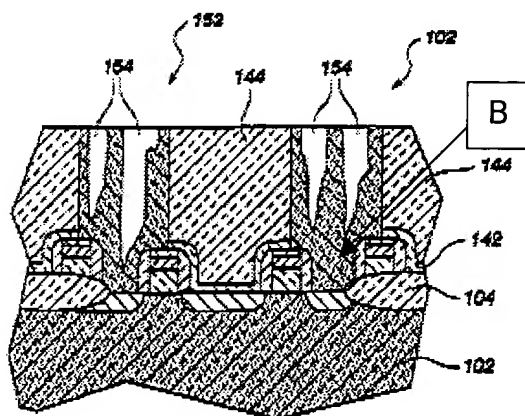


Fig. 22

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Moreover, Applicant is advised that only the proposed definition 2 apply to describe Applicant's invention since as shown in Figure 21 (see below), the webs or mesas formed between the openings (154) share a boundary (B). Thus, the Examiner would interpret the term "contiguous" as structures that share a boundary.

**Fig. 21**

Regarding claim 37-41 and 44-45, the limitations providing a HSG polysilicon layer on said storage poly structure and lining the recesses with a dielectric material are not supported by the Specification. For instance, see Figures 7-10 wherein Applicant shows that the HSG polysilicon layer (122 or 130) is removed before the dielectric (138) is formed.

Claim Rejections - 35 USC § 102

➤ The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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➤ Claims 35 and 42-43 are rejected under 35 U.S.C. 102(b) as being anticipated by Kenney (US Patent No. 5,254,503).

Regarding claims 35 and 43, Kenney teaches an intermediate structure (see cols. 1-6) comprising: a storage poly structure (10) with recesses (20) formed therein (see Fig. 4); a HSG polysilicon layer (14) over said storage poly structure (see Figs. 1-4); and a mask (16) over said HSG polysilicon layer (see Figs. 2-4), said recesses (20) being exposed through said HSG polysilicon layer and said mask (see Fig. 4).

Regarding claim 42, Kenney teaches an intermediate structure (see cols. 1-6) comprising: a storage poly structure (10) (see Fig. 4); a substantially confluent HSG polysilicon layer (14) over said storage poly structure (see Figs. 1-4); and a mask (16) over said substantially confluent HSG polysilicon layer (see Figs. 2-4), elevated portions of said hemispherical-grain polysilicon layer being exposed through said mask (see Fig. 3).

Claim Rejections - 35 USC § 103

➤ The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

➤ Claims 31-32 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ahn et al. (US Patent No. 5,358,888).

Regarding claim 31, Ahn et al. teach a semiconductor capacitor storage poly (see cols. 1-12) comprising downwardly extending recesses (see recesses formed in the storage poly 100 in Figures 6, 16, and 19); and a plurality of contiguous mesas forming a maze-like structure (100) (see Figures 6, 16, and 19).

Regarding claim 32, Ahn et al. teach that said mesas extend in the X, Y and Z coordinates (see Figures 6, 16, and 19).

➤ Claims 33-34 and 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahn et al. (US Patent No. 5,358,888) in view of Kenney (US Patent No. 5,254,503).

Regarding claims 33 and 38-41, Ahn et al. teach a semiconductor capacitor storage poly (see cols. 1-12) comprising downwardly extending recesses (see recesses formed in the storage poly 100 in Figures 6, 16, and 19); and a plurality of contiguous webs forming a maze-like structure (100) (see Figures 6, 16, and 19). However, Ahn et al. fail to teach a HSG polysilicon on top surfaces of at least some of said plurality of contiguous webs. Kenney teaches a well-known process for forming webs or mesas in a

capacitor storage poly (see cols. 1-6) comprising the steps of: growing and masking an HSG polysilicon (14) (see Fig. 2); etching the mask (16) to expose portion of the HSG polysilicon (see Fig. 3); and etching openings (20) so that portions of the HSG polysilicon remain on top surfaces of the webs (see Fig. 4). Therefore, it would have been obvious to one having ordinary skill in the art at the same time the invention was made to modify Ahn et al. to include HSG polysilicon on top surfaces of at least some of said plurality of contiguous webs. The ordinary artisan would have been motivated to modify Ahn et al. in the manner described above for at least the purpose of providing enhanced surface area and increased capacitance. Furthermore, Ahn et al. fail to teach a dielectric layer substantially coating an upper surface of said storage poly structure and substantially lining each of said plurality of recesses. Kenney teaches that it is well known in the art to provide a dielectric layer (22) and a polysilicon layer (24) on the storage poly structure (see Fig. 4). Therefore, it would have been obvious to one having ordinary skill in the art at the same time the invention was made to modify Ahn et al. to include a dielectric layer (22) and a polysilicon layer (24) on the storage poly structure. The ordinary artisan would have been motivated to modify Ahn et al. in the manner described above for at least the purpose of forming a capacitor of enhanced capacitance.

Regarding claim 34, Ahn et al. teach that said mesas extend in the X, Y and Z coordinates (see Figures 6, 16, and 19).

➤ Claims 37-39, 41 and 44-45 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kenney (US Patent No. 5,254,503).

Regarding claims 37-38, Kenney teaches an intermediate structure (see cols. 1-6) comprising: a storage poly structure (10) (see Fig. 4); low elevation regions of a HSG polysilicon layer (14) over said storage poly structure (see Figs. 1-4); recesses (20) (see Fig. 4); and dielectric material (22) at least lining the recesses (see Figs 4 and 5).

Regarding claim 39, Kenney teaches a cell poly structure (24) over said dielectric layer (see Fig. 5).

Regarding claim 41, Kenney teaches that at least some of said plurality of recesses (20) extends into said storage poly structure (10) (see Figs. 4 and 5).

Regarding claims 44-45, Kenney teaches an intermediate structure (see cols. 1-6) comprising: a storage poly structure (10) with recesses (20) formed therein (see Fig. 4); a HSG polysilicon layer (14) over said storage poly structure (see Figs. 1-4); a mask (16) over said HSG polysilicon layer (see Figs. 2-4), said recesses (20) being exposed through said HSG polysilicon layer and said mask (see Fig. 4); and a dielectric material (22) lining at least said recesses (see Fig. 6).

Response to Arguments

➤ Applicant's arguments with respect to claims 31-35 and 37-45 have been considered but are moot in view of the new ground(s) of rejection.


Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R. Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 8:00 - 5:00 Monday through Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JRD
December 28, 2001



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